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RADIUM

EDITED BY
CHARLES H. VIOL, Ph. D.
AND
WILLIAM H. CAMERON, M. D.

VOL. XV

JUNE, 1920

No. 3

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A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY
PHYSICS AND THERAPEUTICS OF RADIUM
AND RADIO-ACTIVE SUBSTANCES

RADIUM

A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY, PHYSICS AND
THERAPEUTICS OF RADIUM AND RADIO-ACTIVE SUBSTANCES

Edited and Published by Charles H. Viol, Ph. D., and William H. Cameron, M. D.
with the assistance of collaborators working in the fields of
Radiochemistry, Radioactivity and Radiumtherapy.

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REVIEWS AND ABSTRACTS

Brayton, Howard W., M.D. (Hartford, Conn.) and Heublein, Arthur C., M.D. (Hartford, Conn.) Enlarged Thymus Gland in Infancy and its Treatment by Radium. Boston Medical and Surgical Journal, No. 26, 740-743, December 25, 1919.

"The size of the thymus gland, in relation to the entire body, is greatest at birth, but the absolute weight of the gland steadily increases up to about the twelfth year, after which it undergoes gradual atrophy."

"The chief clinical interest in the gland centers around its pathological enlargement during the first few years of life, particularly in infancy. Very little is known as to what constitutes the etiology of this pathological overgrowth, although the fact that it is often found enlarged in rickets, syphilis and certain chronic infections has led to the theory that its hyperplasia is an attempt to compensate for the lymphoid exhaustion of these diseases."

"The symptoms of enlarged thymus may be divided into two classes: general and local. Under the former fall the results of faulty endocrine function, such as flabbiness of the tissues, lack of resistance to acute infection, liability to frequent convulsions, eczema, and mental retardation. Some infants never show these generalized disturbances but exhibit only the local symptoms which are referable entirely to the mechanical effect of the enlarged gland. From the fact that the thymus is situated in the upper part of a closed and rigid chest cavity, any gradual or sudden enlargement must of necessity produce pressure on the underlying vital structures. While it is universally admitted that this pressure may cause laryngeal spasm, heart shock, pulmonary engorgement, etc., it has been denied that a structure as soft as the thymus could press upon the trachea to the extent of causing obstruction. This contention seems

to be faulty, however, for in one of our cases tracheoscopy showed an inward bulging to the extent of half the lumen at a point two inches below the vocal cords."

"These local symptoms of thymic pressure are almost entirely respiratory in character and vary from a slight cough, coming on at intervals of a few days or weeks, to a dyspnoea of the most profound type. The cough is often croupy and paroxysmal, worse during feeding, and is out of proportion to the clinical findings in the throat or chest. During these attacks of cough there are often a few rales at the bases of the lungs, but whether this moisture is a mild exciting cause of the cough or whether it is a congestion due to obstruction of the pulmonary veins is not clear."

"Accompanying the cough, or independent of it, there is usually present a certain amount of dyspnoea which is largely inspiratory in type and aggravated during feeding and in the course of acute illnesses. The respirations at these times are distinctly audible. If the dyspnoea is at all pronounced cyanosis is likewise present and may vary in degree from a transitory bluish tinge to the lips and nails to a constant extreme lividity. When the asphyxia reaches a certain point death ensues or generalized clonic convulsions appear which may terminate in either death or recovery. Not all cases of thymic death are due to obstructed respiration, however, for in a certain number of those occurring suddenly during anaesthesia and after fright there is very little dyspnoea. It is probable that in these instances pressure of the acutely congested gland causes reflex heart shock."

"The diagnosis of enlarged thymus must be made both from the history and physical examination. If cough, stridor, or cyanosis is present in the history it is suggestive, but when the history is negative, examination alone must suffice."

"Inspection often reveals a flabby, poorly muscled child with a bulging of the upper front chest. Some authors have described the gland as visible in the suprasternal notch during inspiration, but in only one of our cases were we able to duplicate their findings. Percussion generally gives an area of dullness extending either side of and continuous with the usual hyporesonance of the upper sternum. The dullness, as a rule, is more pronounced on the left, but unless very light percussion is employed the entire area will be observed by the transmitted resonance of the underlying lung."

"Often when dyspnoea and retraction are slight, they may be accentuated, or when absent may be produced, by gently extending the head over the edge of a pillow. This procedure, however, should never be resorted to in extreme cases for fear of sudden death."

"The one diagnostic means which stands above all others and the only one which is infallible is the X-ray. By its use the contour of the gland may be seen normally projecting but little either side of the sternum, and continuous with the heart shadow:—compared often to the neck of a gourd extending up to the clavicles. Normally the sides of the shadow are concave, while the enlarged gland gives an outline the sides of which are both displaced laterally and bent convexly. The left lobe of the gland is usually enlarged more than the right, which corresponds with the percussion findings. Great care must be exercised in placing the child flat on the back during the exposure for otherwise the mediastinal structures will be projected obliquely, with a resulting worthless negative."

"The treatment of enlarged thymus is simple and specific; it consists solely in radiotherapy. Although for over a decade the X-ray had been employed to decrease the size of the gland, the method did not come into general use until about four years ago. Even then the technique of treatment varied so in the hands of different workers that contradictory reports arose as to its efficacy. The matter was finally clearly defined in 1917 when Friedlander published a series of over a hundred cases in only four of which X-ray therapy was not successful. He attributed his good results partly to his standardized method of treatment, which consists in using a tube of known penetration, a constant target-skin distance, a filter of certain thickness, a definite length of exposure and repeated treatments."

"Two years ago one of the writers (H.W.B.) was asked to see an infant who was in a desperate condition from thymic asthma. Roentgen ray treatment was advised and the case referred to the other writer (A.C.H.) who suggested that, owing to the extreme severity of the case, radium be substituted in the hope that its effect might be more prompt. Radium had produced such marvelous shrinkage of certain tumors of other structures that it seemed justifiable to apply it in this nearly moribund case, even though its use in this condition had never been reported in the literature. The results of this substitution were so satisfactory that ever since radium has been used exclusively in both hospital and private cases."

"The technique of treatment is as follows: 100 milligrammes of radium element, still in its 0.5 millimeter silver capsule, is wrapped in sufficient gauze so that when strapped to the chest by a strip of adhesive, it will lie a half-inch from the skin surface. Four marks are made in the form of a rectangle over the thymic area and the nurse is instructed to allow the package of radium to remain two hours over each mark. This makes a total exposure of 800 milligramme-hours. From the moment a diagnosis of enlarged thymus is made the child's head should be kept in a flexed position, thus lessening the severity of the asthma and the possibility of sudden death."

"Judged solely from the end-results, there is little choice between radium and X-ray. By both methods a cure is effected, provided the child survives the effects of thymic pressure until the radiotherapy has had opportunity to reduce the gland. Radium does have certain advantages over the roentgen ray which may be summarized as follows: The action of radium is more rapid; with radium one treatment alone suffices to effect a cure, even in the severest forms of the disease; radium is portable, thus obviating the difficulty of transporting the patient to a roentgen laboratory; the application of radium is simple, thus eliminating the dangerous element of fear from the mind of the patient, and at the same time rendering unnecessary the use of an elaborate X-ray equipment and highly skilled operator."

"To date we have treated thirty-four cases of enlarged thymus with radium. In every instance there followed a prompt and lasting disappearance of all symptoms. Two of these patients died more than a month after treatment, one with influenza and the other from inexplicable convulsions."

"Three illustrative cases follow:"

"I. Male, 14 months of age, with a history of eczema, weakness and convulsions from birth. On close questioning these convulsive seizures

were found to consist of the following sequence of events: sudden asphyxia, cyanosis, retraction of the neck, general clonic contractions, syncope followed by exhaustion. Examination showed a flabby, eczematous child with bulging of the upper chest and well-defined thymic dullness. X-ray corroborated these findings. Radium was applied. The child had no more convulsions and one week later the skiagram showed a normal thymic area."

"2. A male infant, twelve pounds in weight, was seen one hour after birth. The labor had been easy but with the first cry the obstetrician had noticed that the child's breathing was decidedly abnormal. The patient presented the most unusual appearance; the skin, lips and nails were intensely cyanotic and the inspiratory stridor was distinctly audible in the adjoining room, while the epigastric retraction was equal to that accompanying the severest forms of laryngeal diphtheria. Percussion and X-ray both detected the presence of a thymus filling nearly one-half the chest cavity, while inspection, palpation, and X-ray all revealed the presence of an enormous thyroid occupying the entire front of the neck as far back as the lobes of the ears. Radium was applied and within 48 hours the baby showed decided improvement which continued until, at the end of a week, he was nearly normal in appearance. It was interesting to note that the thyroid disappeared coincidently with the shrinkage of the thymus. X-ray plates two and ten weeks after treatment showed a normal thymic outline. The child was still perfectly well fifteen months after discharge from the Hartford Hospital."

"3. A female of 11 months who had always breathed "as though she had a cold." Frequent attacks of choking and cyanosis, particularly at time of feeding. X-ray confirmed the percussion findings of enlarged thymus. One week after treatment the child was perfectly well and the skiagram showed a normal thymic shadow."

"The severer types of thymic enlargement, which are comparatively rare, are easy of diagnosis, but the milder forms of the disease, which go to make up the great majority, are readily overlooked. The more one sees of this condition the more careful he is to look for it in each new patient. Every infant who has "queer spells," who has habitual attacks of coughing, choking, dyspnoea, or cyanosis, should have an X-ray of its chest in the hope of finding a condition which is so easily and satisfactorily cured."

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Mottram, J. C., M. B. and Clarke, J. R. (London) The Leucocytic Blood-Content of Those Handling Radium for Therapeutic Purposes. Archives of Radiology and Electrotherapy, No. 237, 345-350, April, 1920. At a meeting of the Section, held December 19, 1919.

"These radium workers are subject to widely different amounts of irradiation according as to whether their employment necessitates their being near to or distant from the radium, and whether for long or short periods of time. Among the workers under observation two classes were especially subject to exposure: (A) Laboratory workers who prepare and measure applicators containing emanation and radium; and (B) clinical workers who attach various screens to the radium applicators and subsequently apply them to patients. The remaining workers receive less exposure, down to the servants of the institution, who are only

subject to very small quantities of the gamma radiation which prevades the whole building."

"The leucocytic blood content of all these individuals (twenty in number) is shown diagrammatically in Fig. 1, in which a comparison is made with thirty-eight normal individuals. (The normal figures were obtained from a paper on the effect of solar dermatitis on the leucocytes of the blood). The diagram shows that the polymorphonuclear leucocytic and the lymphocytic blood content of the radium workers is decidedly lower than that of the normals. In the case of the polymor-

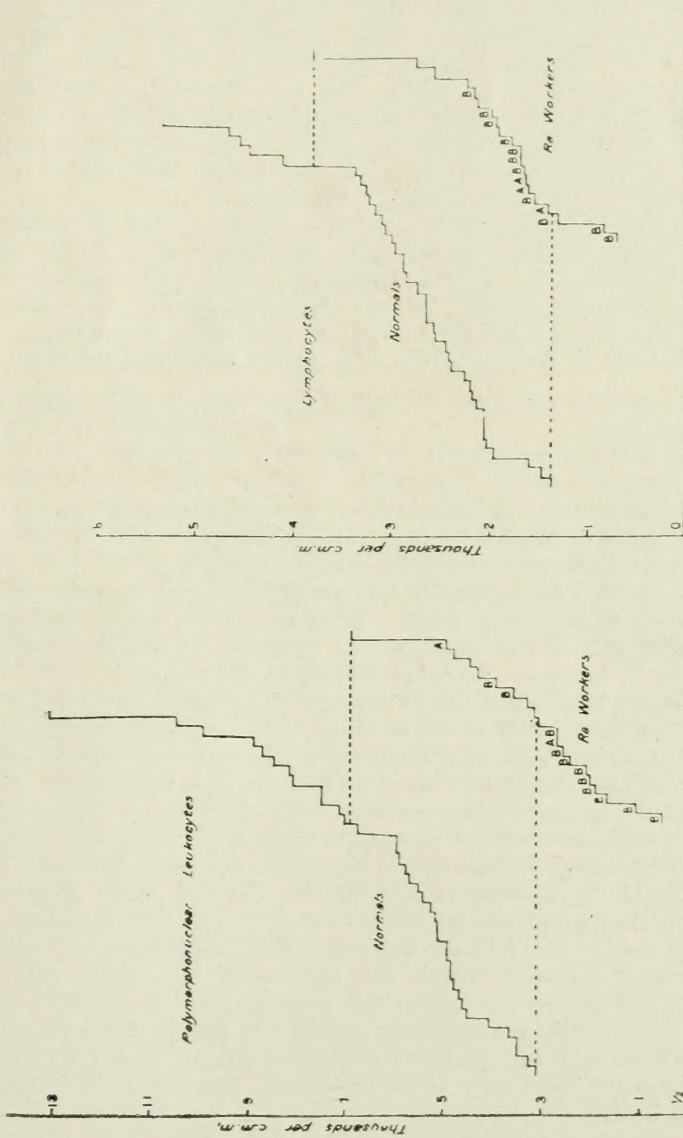


Fig. 1.—Each step in the diagram represents a single individual. A, laboratory worker; B, clinical worker.

phonuclear leucocytes, there are eleven individuals below the lowest normal, and in the case of the lymphocytes three below the lowest normal. The lowest figures are: For polymorphs, 522 and 1,035 per cubic millimetre, and for lymphocytes, 706 and 855 per cubic millimetre. The classes A and B are indicated in the diagram, and are seen to form the large majority of the more affected workers. The exceptionally high A in the polymorph chart showed subsequently much lower readings of 2,048 and 2,343. Similar, but less marked, blood changes have been described in X-ray workers, and a leucopænia has been produced experimentally in animals with X-rays by a number of observers."

"Attention is drawn to the absence of any evidence of a leucocytosis even among the less irradiated workers, the highest counts falling near the middle of the normal series. This indicates that a daily dose of irradiation, even when very small, will not produce a leucocytosis; whereas it is known that in small animals alternate periods of X-radiation and freedom from irradiation will, under certain conditions, produce a profound leucocytosis, and that the leucopænia following a single dose of X-rays is often followed by a leucocytosis."

"The leucopænia of radium workers, classes A and B, manifests itself after a few weeks' exposure—for instance, a class A individual showed a fall from 7,283 to 3,077 polymorphs, and from 4,544 to 1,612 lymphocytes after one month; the corresponding figures for a class B worker were 4,448 to 2,398 and 1,824 to 1,690 after two weeks. The effect of a holiday of two months is well seen in the following case:—

	Before holiday	After holiday	25 days later
Polymorphonuclears	522	1,909	1,063
Lymphocytes	885	2,158	857

"On the other hand in several cases a holiday of two months was followed by a fall instead of a rise. It is thus clear that the onset of the fall is rapid, and the recovery by comparison slow."

"No association between this leucopænia and any condition of ill-health has been definitely recorded. Whitlows of the fingers and other infective conditions of the hands are of common occurrence in radium workers; this is, however, probably due to local changes."

"An attempt has been made to estimate the daily amount of irradiation which workers of class B receive. Electroscopic measurements were found to be impracticable, as the leak was so great that the instrument could not be charged in the room where the attachment of the screens to the radium applicators was carried out. A photographic plate was, therefore, made to occupy the place of a worker. It was screened with varying thicknesses of aluminum from 0.2 mm. to 2 mm. The shadows which resulted on development were of nearly equal density, showing that gamma radiation was chiefly affecting the plate. A control plate was exposed to the gamma radiation (3 mm. lead and 0.2 mm. aluminum screens) from an applicator having 9 mgr. of $\text{RaBr}_2 \cdot 2\text{H}_2\text{O}$ per square centimetre for varying lengths of time. The two plates were developed together, and it was found that one minute exposure to the applicator produced a shadow similar to that on the experimental plate. This may be conveniently expressed in biological X-ray units, Rads."

"This unit is an exposure to the beta and gamma rays from 2.75 mgr. of $\text{RaBr}_2 \cdot 2\text{H}_2\text{O}$ per square centimetre for one hour; this dose is

just sufficient to prevent the growth of rat sarcoma and to produce an erythema when applied to the human skin. Assuming that the radiant energy of beta plus gamma rays is to gamma rays as 50 to 1, then class B workers receive 1/900 of a rad daily per square centimetre. This small amount is, however, incident over the entire front surface of the body, and, as a generalized condition is under consideration, an attempt is made to estimate the total amount of incident radiation and to compare this with the amount received by a patient undergoing treatment for cancer of the breast."

A mathematical computation of the dosage given is omitted.

"Taking now, as the case of a typical radium treatment for cancer of the breast, a set of applicators grouped over a circle of 3 cm. radius, totalling 200 mgr., and left on for thirty hours, screened by 2 mm. of lead. In this case the "dose" is 6,000 milligram-hours."

"The area exposed by a class B worker, assuming the body cylindrical as before, of the same radium, and 20 cm. thick, is 3,000 sq. cm. From the results given above a total radiation measurable as 1,413.72 would be received per day. In other words class B workers receive daily about 1.4 per cent. of the total radiation received by a patient during a course of treatment for carcinoma. It follows, therefore, that every ten weeks a class B worker receives the same quantity of radiation as a patient undergoing treatment for cancer of the breast. It is clear, however, that whereas in the case of the patient the radiation is concentrated over a small area, in the case of the class B worker the radiation is spread over the whole body surface."

Editorial comment on this paper in the same issue of the Archives of Radiology and Electrotherapy:

"The paper by Dr. Mottram and Mr. Clarke, reproduced from the Proceedings of the Royal Society of Medicine (Electrotherapeutic Section), Vol. 13, calls attention to the blood changes produced in man by the gamma rays from radium. The problem of adequate protection from these very penetrating rays is perhaps the most difficult with which the radiologist has to contend. The growing recognition of the necessity for protective measures in all X-ray work is partly the outcome of the war and partly the result of the wider knowledge of the harmful effects which result from inadequate protection."

"In the case of radium, the use of which in medical procedures is limited to therapy, the question is likely to become more and more pressing as larger and larger quantities are handled. With quantities of the order of a gram the gamma radiation is considerable, and though very much less active as regards photographic or electrical action than the X rays emitted by a Coolidge tube, we can look upon the act of handling such a quantity as that of handling an X-ray tube in operation, and, in fact, a tube that is continuously in operation. That is the nature of the problem with radium, and any protective measures to meet the case must be thought out at each step, from the moment the radium is taken, say from its safe, to the time when it is applied to the patient, how to protect the operators. It is not an easy matter and will doubtless receive different treatment in different centres of radium therapy."

"The paper in question shows that remarkable changes occur in the blood of people exposed daily to small doses of such radiation; changes in fact of an undesirable nature. The authors have, no doubt, used the most appropriate indicator under the circumstances, for it is now a well established fact that in the X-ray and gamma ray portion of the spec-

trum, the skin is less sensitive to the rays of very short wave-lengths than it is to those of longer wave-lengths, *i.e.*, to "softer" rays; the blood changes however are found to occur with hard X rays as well as with soft X rays, and, it so happens, also with gamma rays."

"The importance of Dr. Mottram's paper will not be lost upon those who are vitally interested in seeing the whole of radiological work freed from the dangers which have attended it in the past."

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H. J. Bagg, (New York). Pathologic Changes Accompanying the Injection of an Active Deposit of Radium Emanation. I. Intravenous and Subcutaneous Injections in the White Rat. J. Cancer Research, 1920, v. 1. Abstracted in Surgery, Gynecology and Obstetrics, xxx, 381, May, 1920.

"Very little is known concerning the changes that occur in living tissue following the injection of solutions of an "active deposit" of radium emanation. The investigation here reported was undertaken by the author to determine the nature of the changes in the principal organs of the animal body following such treatment and to obtain data that might serve as a guide in the treatment of certain types of cancer to which the solution method of radium therapy appears particularly adapted."

"The investigation consisted of two parts, the first dealing with intravenous injections, and the second with subcutaneous injections of the "active deposit" of radium emanation."

"Following injections of an "active deposit" of radium emanation there was a diffusion of the radio-active substance throughout the animal body which resulted in pathologic changes in the various organs. The changes occurring in the liver, lungs, kidneys, adrenals, spleen, bone marrow, brain and vascular system are minutely described. The most interesting change was fatty degeneration in the liver which was brought about by comparatively small subcutaneous doses of radium. This degeneration was characterized by the presence of many giant cells and hyperchromatic nuclei, and persisted for a comparatively long time after the treatment."

"Frequently following large doses of radium, congestion and hæmorrhages were found in practically all of the organs. In the severe cases the animals died with symptoms of severe enteritis."

"The pathologic condition most frequently found in the kidney was a granular degeneration and erosion of the renal cells."

"In the bones the injections of radium caused the destruction of the cells of the bone marrow and their replacement by blood."

"In the spleen congestion was the most constant feature following the treatment, and in some cases this was associated with hæmorrhages and the destruction of red blood cells."

"In certain organs the method of injecting the radium determined to a certain extent, the severity of the reaction. For example, following subcutaneous injections there was no appreciable pathologic reaction in the lungs, but following intravenous doses of about the same strength, the pulmonary lesions were severe, consisting of proliferation and desquamation of the epithelial cells of the bronchi, marked œdema, congestion and hæmorrhage."

"It appeared that doses of radium less than 10 mc. were not fatal to

the experimental animals. Doses above this amount caused death within a few hours or a few days, the reaction being somewhat less severe when the injection was subcutaneous."

"A similarity was noted in the tissue reaction due to radium injected intravenously or subcutaneously and radium applied externally."

"The fate of radium after its injection in the animal organism and its subsequent elimination are discussed in some detail. The results of this investigation show that the liver, gastro-intestinal tract, kidneys, lungs and spleen received the greatest amount of radio-activity."

"Degenerative changes in the cell and their interpretation are also discussed. The histologic study seemed to indicate that cytoplasmic changes occurring in the cell were profound and as severe as those in the nucleoplasm."

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H. C. Taylor (New York). The Treatment of Cancer of the Uterus. New York State J. M., 1920, xx, 8. Abstracted in Surgery, Gynecology and Obstetrics, xxx, 390, 391, May, 1920.

"From a study of vital statistics, Taylor estimates that in the State of New York there are annually over 1,100 deaths from cancer of the uterus, that these cases constitute one-quarter of the deaths from cancer among females, that about 1 woman in 32 past the age of 40 dies of cancer of the uterus, and that if a woman becomes a victim of this disease she has about one chance in fifty of escaping death from it."

"The treatment of cancer of the uterus is considered under four headings: (1) publicity and education, (2) prophylaxis, (3) treatment of operable cases, and (4) treatment of inoperable cases."

TREATMENT OF OPERABLE CASES

"The definition of an operable case of cancer is frequently changed. A few years ago, before radium was in common use, many cases were considered operable that would now be placed in the inoperable class. Formerly it was known that if a case was not operated on there was no hope and therefore surgeons were led to operate in many instances when the chance of cure was comparatively small and the risk of the operation correspondingly great. With the use of radium, a case is not necessarily hopeless without operation, and even if the condition is not permanently cured life may be prolonged and the patient made more comfortable."

"The use of radium, however, has developed another class of cases, that is, cases which were inoperable before treatment but as a result of the use of radium have become operable."

"In the treatment of operable cases, i.e., cases in which the growth is limited to the uterus with possibly a limited superficial involvement of the vaginal walls, the author believes a combination of radium and operation offers the greatest hope of a permanent cure. It is his custom in such cases to make an application of radium, usually 100 milligrams for twenty-four hours, and then after waiting a week to allow the possible reaction from the radium to subside, to perform such an abdominal hysterectomy as is indicated. If the case is favorable, he does a radical abdominal hysterectomy with isolation of the ureters and removal of the pelvic connective tissue as far as possible. If the case is more difficult on account of a thick abdominal wall or any concurrent constitutional disease, he is satisfied with a simple hysterectomy."

"It has been stated that after the use of radium a hysterectomy is more difficult on account of the increased danger of hæmorrhage and the absence of the usual planes of cleavage. In the author's opinion, however, the increased difficulty is not sufficient to contra-indicate an operation. There may be some increased bleeding, but in no case was it hard to control. There is usually some cedema about the bladder fold and at the bases of the broad ligaments, but this has never interfered materially with the operation in any of the author's cases nor with the subsequent healing of the wound. In one case the application of radium was followed by a marked febrile reaction and the operation was not performed until a month later. It was then done without any great difficulty. Following the operation and previous to the patient's discharge from the hospital at the end of three or four weeks, the author applies radium to the top of the vagina. He has followed this method in 12 cases without one death."

TREATMENT OF INOPERABLE CASES

"Some cases of cancer are so advanced when first seen that it would be folly to do anything except give morphine for the relief of pain and discomfort and proper douches for cleanliness. In these cases the possibility of causing irritation to the bladder or rectum is such that the patients are more comfortable without any local application of radium. Excluding these hopeless cases, however, there has been nothing in the author's experience that has produced the favorable results obtained with radium in the treatment of inoperable cancer of the cervix. He prefers it to the cautery because it may be applied without an anæsthetic and with practically no discomfort, it requires but a short stay in the hospital, and its results are often striking."

"In some instances the patients apparently cured by the use of radium are in reality not cured. Theoretically, it would seem that some of these might be saved by a hysterectomy. Therefore, if a case is a good operable risk, that is, if there is no constitutional contra-indication and the patient is not too fat, it is the author's custom to do a simple hysterectomy or a modified radical operation."

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Lynch, Frank W. (San Francisco). The Problem of Uterine Cancer. *California State Journal of Medicine*, xviii, 47-48-49, February, 1920. Read before the Forty-eighth Annual Meeting of the Medical Society, State of California, Santa Barbara, April, 1919.

"During the last few years, there has been attracted to the Woman's Clinic of the University of California Hospital—in large part because of our work with radium—an ever increasing number of cases of uterine cancer. No one, I am certain, could study the data offered by this mass of material without concluding very definitely that the general profession is doing little to improve the cancer situation, and that this disease in the hands of men doing surgery is quite as hopeless as it was years ago when MacMonagle reported his series of 481 hysterectomies for uterine cancer with only two ultimate cures, and when Baldy confessed that he had never cured a case by any form of treatment."

"There is no doubt but that we may not attain a proper solution of the cancer problem until the laity is educated to appreciate the importance of the earliest symptoms. Yet such education will avail but little a

patient who falls into the hands of one who has not yet recognized the essentials of proper treatment. I, for one, believe that we will make greater headway in our problem by devoting our chief effort at present to the physician rather than to the laymen, since the physician has long been led afiel by a mass of conflicting literature."

"To my mind, a large part of the confusion in the literature has developed because the earlier student of cancer grouped in his investigation cancers from all parts of the body, ignorant of the fact that cancers differ markedly among themselves. In the same manner, our gynecologic literature teems with contradictory statements because so many have grouped together in their study all uterine cancers, which differ so markedly among themselves in habits of growth. Cancer of the cervix constitutes the problem of uterine cancer because so few are cured. In comparison with cervical cancers, the carcinomata of the uterine body lose their importance since they usually permit of cure."

"Personally, I have never seen a late case whose condition was improved by operation. More than twenty years ago, no less an authority than Sanger abandoned such treatment on the ground that the reverse was true, since it gave no hope of cure in extended growths and actually intensified the subsequent suffering. Case after case comes to our clinic for radium with infected ulcers and large pelvic masses almost fresh from the hands of surgeons who have done the simple hysterectomy, proving the long established rule that it is worse than useless to cut through cancerous tissues. We have learned also by experience that radium does not do much for the improvement of such cases."

"Out of the myriads of cancer articles has come the now accepted truth that we are justified in surgical measures only when they are most extensive, and that all operations should be restricted to early cases. The large remainder are better treated by radium. Experience is teaching us daily that if there is question as to operability, the case does not permit of cure by surgery. Education of the laity and physician alone will bring us earlier cases, since the extreme of operative treatment has been reached in the extended operation."

"Experience with radium convinces me that early growths are best treated by extended removal, and all others by radium, which has no equal as a palliative measure. Whether radium cures or not may be an open question, but nothing treats so successfully a case which does not permit of extensive operation. It is more than likely, however, that early cases alone permit of cure, be the treatment what it may. A year ago, I reported my work with 50 to 90 mgs. of radium. We now believe that these amounts are small if one seeks a cure. We are now working with 100 and 150 mgs. The point is often advanced that radium treatments should precede all operations. A year ago, I reported a case operated after radium presenting many pelvic adhesions. We have had very recently one other case of operation after a seemingly inoperable growth had been made apparently operable by radium treatments. Under its use the ulcer disappeared and the vaginal vault became smooth. The parametria became softened and the uterus felt free. Yet a removal proved impossible since the growth extended far out beyond the ureter which was imbedded in a mass of softened cancerous tissue, adding one more proof that we should select our cases either for extensive operation or radium alone."

"Finally, we present these points as conclusions:

1. Early cases alone afford hope of cure and the education of

physician and laity is necessary before results show marked improvements.

II. Pre-operative removal of tissue for microscopic study must be followed by immediate operation if operation is contemplated.

III. The presence of an ulcer complicates the problem of uterine cancer.

IV. The curette should not be used in cleaning up an ulcer.

V. Early cases alone should be operated and only by the extended operation.

VI. All other cases should be treated by radium.

VII. Simple hysterectomy has no place whatever in the therapeutics of cervical cancer."

* * * * *

Marty, Loraine A. (Kansas City, Mo.) Comparative Value of Roentgen and Radium Rays. The Urologic and Cutaneous Review, xxiv, 197-198, April, 1920.

"After a large and rather favorable experience with roentgen ray treatment in both malignant and benign conditions, it was with considerable hesitation that I took up the use of radium some time ago."

"There are two classes of physicians always, those who are slow to change from old and tried methods to something new, and those who are always riding new hobbies. I have always tried to keep up with medical advance, but still have tried to always be conservative and never become one who always has a new hobby to ride."

"I read everything on radium that I could get my hands on for a good many years, but as most men seemed to think that the roentgen and radium rays were identical in their action, I let things drift along, for if they had the same action I could see little use for the taking up of a large investment, learning new dosage, reactions, etc., when I was already familiar with the roentgen ray treatment."

"But, when it comes to the treatment of malignant and certain benign conditions, our results have never been anything like what we desired, and my ambition to secure better results finally led me to the purchase of radium."

"Now, after considerable time has elapsed, I wish to say that the action of radium rays is so much more rapid, always uniform, and is so much safer to use, that I am sorry I waited as long as I did before beginning its use. When radium is applied to fungating tumors, they melt away like snow in the hot sunshine. There is no fuss and bluster as with the roentgen ray, no danger of electrical shock to the patient, less danger to the operator, less danger of burns. And if too much reaction is obtained it heals so readily as compared to the roentgen ray burn, that one need have very little worry about securing healing."

"Do not gather from what I have said that I have discarded the roentgen ray in my work, for such is far from the case. I am using it as much as ever. Here is the thing briefly put. The effective action of radium is limited to a few centimeters at most, while the roentgen ray penetrates a much greater distance."

"This at once suggests the proper use for each element. Radium when it can be gotten close to the trouble and the roentgen ray for deeper seated conditions."

"I am free to say that in nearly everything except the superficial conditions I use both in combination. We no longer need the roentgen ray for the superficial conditions, such as skin malignancies, warts, moles, keloids and other skin conditions, unless they cover so large an area that it takes too much time to cover them with the radium applicators, for it is much easier to cover large areas with the roentgen rays than with the radium rays. However, in many of these conditions it is very satisfactory to use the radium directly on the ulcer or tumor, and then cross-fire through from the back with the roentgen rays, when it would be too great a distance to ray through from the back effectively with radium."

"I do not know why it is that the radium ray is so much more active than the roentgen ray when it can be gotten close to a part, but it seems to me that we should no longer keep up the old saying that the action of the two energies is identical. Careful study will bring you to this same opinion."

"When it comes to deep-seated conditions, we must rely to a much greater extent on the roentgen ray. Uterine conditions can be attacked from the inside with the radium, and from the outside, all around the entire trunk, with the roentgen rays. Such is the best treatment for all conditions now by making an external opening for the insertion of the radium, and the men who are doing the best work today are using this semi-surgical method. Get the radium to a malignant cell and it will do the rest. So would the roentgen ray if it could be handled with as much ease, and we could get enough to the malignant cell without burning the superimposed tissues. This can be accomplished very well with the radium applicator as it only requires a small opening down to the parts, the radium can be put in and left there for hours or days and the doctor can go on with his other work, leaving the little miracle worker busy at its job, until the work is done. There is no expensive apparatus running all the time, and no necessity for an eagle eye on the case every minute of the time to see that no harm comes to the patient."

"The title of this paper is rather a misnomer, for you really cannot compare the actions of the roentgen and radium rays. We get the alpha, beta and gamma rays from each, they can both be filtered the same way so as to obtain just the action we desire, but from what I have said above it becomes readily apparent what the indications are for the use of either energy. You can get just as soft a ray from the Crookes' tube as you can from radium, but this same degree of softness would be back at the target of the tube rather than at the glass bulb, and even were it at the circumference of the bulb, it could not be applied with any such nicety to many lesions where radium is now used so conveniently and the measurement of dosage could not be nearly as accurate, for it is well known that the soft roentgen rays cannot be measured with the same accuracy and consequent safety as can the harder rays."

"On the other hand, radium will give us a much harder ray than we are able to obtain from any Crookes' tube known at this time, but it does not reach out as far, so then comes the necessity for the roentgen ray."

"Summarizing then, one might say: You cannot compare the actions of the roentgen rays and the radium rays."

"They are both absolutely necessary in our work, each with its definite indication, but the action of one overlapping that of the other so that in many conditions one can obtain like results with either."

"But in our every-day work, the man who is using radium alone is making the same big mistake that the man is making who is ignoring

radium and is depending on Roentgen rays alone as his supply in cases where radiant energy is indicated."

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Benjamin S. Barringer, M. D. (New York). A Case of Carcinoma of the Prostate Controlled for Three and One-half Years by Radium. *Int. Jour. of Surg.*, xxxii, 239, August, 1919. Presented, May 21, 1919, before the Section on Genito-Urinary Surgery, of the New York Academy of Medicine.

"The patient was first seen in Bellevue Hospital in October, 1915. The whole staff examined him. He came in with the history of loss of weight (23 lbs.) and strength for the past six months. At that time the rectal examination showed a hard, thick, and irregular growth, with some extension around the left seminal vesicle. The left lobe of the prostate was more prominent than the right. This was the first case to be treated by radium, and it was purely in the nature of an experiment that we put the radium into his prostate. He had a dose of about 300 millicurie hours, unscreened, in each lobe of the prostate. He did not show any shrinkage of the prostate until January, 1916, that is, about three months after the first treatment, when the prostate had gone down very noticeably. There were still lumps to be felt, and he was treated on and off every three or four months. The last treatment was given in February, 1918. I have not examined him in a number of months, but at that time you could feel no carcinoma of the prostate. His was one of the few cases where apparently the carcinoma was more or less confined to the prostate, and it has reacted to local treatment very well. He has gained back his weight, is working and has no frequency of urination. The case here tonight I believe is cured."

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L. Barajas. The Treatment of Laryngeal Neoplasms with Radium (*Tratamiento por el radium de las neoplasias en la laringe*). *Med. Ibera*, Numero extra-ordinario, I Cong. nac. de med. y cirug., II. *International Abstract of Surgery*, *Surg. Gynec. and Obst.*, 479-480, December, 1919.

"As they are still uncertain, the results of the use of radium in laryngology are at present being carefully watched."

"The radium should be placed in the larynx *in situ*, using the gamma rays and avoiding the stimulant action of the secondary rays."

"Cases of spreading epithelial tumors evidently undergo a process of amelioration, even to an apparent cure, after the first applications of radium if the dosage is adapted to the case and the subject. In all of the cases observed by the author, however, the tumors re-appeared in a very short time and in 58 cases not one complete cure was obtained."

"Radium exerts a positive retarding action on the growth of neoplasms, in some instances causing an encysted lardaceous degeneration."

"Its analgesic action in moderate doses is evident and constitutes one of its most important benefits."

"The use of radium does not change the indications for operation which is the best treatment, but it is particularly valuable in the treatment of patients who refuse operation."

"It is not known to what extent postoperative applications influence recurrences because those in whom recurrence has begun go on in the same way in spite of the radiation, and when there is no recurrence we cannot be sure whether this condition is due to successful surgery or the radiation."

"The dosage of radium is important. In the author's observations he found that the quantity should not be less than 45 or 50 milligrams nor more than 75 or 80 milligrams, with a maximum duration of two hours each session."

"The applications should be as frequent as the reaction of the organism after treatment will permit."

"The reaction is the more rapid and intense the greater the amount of the element that is used and the longer the duration of the session."

"In the haemorrhagic forms of neoplasms the use of radium is contra-indicated as it increases the haemorrhage from the neoplasm and the area immediately surrounding it."

"The pavement-celled epithelioma is the most refractory to radiotherapy and its exacerbations most evident."

"The beneficial action of radium is extremely definite in papillomata, absolute cure having been observed in cases of multiple recurrent tumors of this type."

"In ulcerative tuberculosis radium is completely contra-indicated, while in lupus its benefit is positive."

"Barajas is satisfied that radium merely retards the development of some varieties of epitheliomata, hastens it in others, and completely cures none, but that it greatly decreases the pain."

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J. Heyman (Christiania). The Results of Radium Treatment of Uterine Cancer. XII Versamml. nord. chir. Ver. Christiania, 1919, July. Abstracted in *Surgery, Gynecology and Obstetrics*, xxx, 393, May, 1920.

"Heyman's report includes cases of uterine carcinoma treated with radium during the year 1914-15 and hence observed for a period of five years."

"Twenty-six patients were treated in 1914. In July, 1919, 7 of these were clinically cured, 17 had died of cancer, and 2 had died of some intercurrent disease."

"In 1915, 40 patients were treated. Of these, 11 were clinically cured in July, 1919 (1 was cured after a prior radium treatment, but was operated upon later because of recurrence), and the remainder had either died or could not be traced."

"The success of the radium treatment—cures amounting to 26.9 per cent after five years—therefore exceeds that of surgical operation which gives an average of absolute cures amounting to 20 per cent."

"The large number of recoveries in 1914 and almost equal number of successful results in 1915 cannot be regarded as a mere coincidence. Of the total number of 66 cases, 85 per cent were inoperable."

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RADIUM

AMERICAN RADIUM SOCIETY

The fifth Annual Meeting of the American Radium Society was held in New Orleans, on Monday, April 26, 1920, Dr. Henry K. Pancoast presiding. The Scientific session was held in the Scottish Rite Cathedral, and the following papers were presented.

Economic Problems of Radium Therapy.

Dr. Albert Soiland, Los Angeles, California.

The Absorption of Radium Radiation by the Tissues.

Dr. G. Failla, New York City.

SYMPOSIUM UPON THE USE OF RADIUM IN MALIGNANCY

The Treatment of Fibroids and the Metropathies by Radium.

Dr. C. Jeff Miller, New Orleans, Louisiana.

Review of 600 Cases of Menorrhagia and Uterine Myomas.

Dr. Leda J. Stacy, Rochester, Minnesota.

Combined Radium and Roentgen Therapy of Uterine Cancer.

Dr. E. H. Skinner, Kansas City, Missouri.

The Classification of Cancer Cases for the Study of the Efficacy of Radium and Roentgen Therapy.

Dr. Henry Schmitz, Chicago, Illinois.

Radium in the Treatment of Angiomata.

Dr. William S. Newcomet, Philadelphia, Pennsylvania.

SYMPOSIUM UPON UTERINE DISEASE

Use of Emanation in the Treatment of Malignant Tumors.

Dr. H. H. Janeway, New York City. (Read by Dr. Failla).

The Treatment of Recurrent and Metastatic Carcinoma of the Breast.

Dr. Geo. E. Pfahler, Philadelphia, Pa.

Demonstration of new needle holder by Dr. J. T. Case, and a discussion of New Methods of Treatment by Dr. J. M. Lee.

Dr. Matas, who was to have been the honor guest at the Annual Banquet, found it impossible to attend the dinner and gave instead a very interesting talk in the Scientific session on his observations on the use of radium.

The following officers were elected for the year:

Dr. Henry Schmitz, Chicago, President.

Dr. H. H. Janeway, New York, First Vice President.

Dr. Leda J. Stacy, Rochester, Minn., 2nd Vice President.

Dr. W. H. Newcomet, Philadelphia, Secretary.

Dr. R. E. Loucks, Detroit, Treasurer.

Dr. H. K. Pancoast, Philadelphia, Member of Executive Committee.

The Annual Banquet of the Society was held at 8 o'clock at the Hotel de Soto and was greatly enjoyed by all present. The greatest credit and warmest thanks of the Society are due the Local Committee, consisting of Dr. E. C. Samuel and Dr. Adolph Henrique, for the admirable way in which all arrangements were made and for the splendid and unique entertainment at the banquet.

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